

What is Claimed is:

1. A valve plug comprising:
a spacer tube comprising a proximal end, a distal end and an outer surface, the proximal end of the spacer tube being connected to a proximal guide ring and the
5 distal end of the spacer tube being connected to a distal guide ring, the spacer tube being fabricated from a first material having a first CTE, the proximal guide ring being fabricated from a second material having a second CTE, and the distal guide ring being fabricated from a third material having a third CTE that is greater than both the first and third CTEs.
10
2. The valve plug of claim 1 wherein the second CTE is within about 10% of the first CTE.
3. The valve plug of claim 1 wherein the first and second materials are
15 alloy steels and the third material is an austenitic stainless steel.
4. The valve plug of claim 1 wherein the first and second materials are the same and are an alloy steel and the third material is an austenitic stainless steel.
- 20 5. The valve of claim 1 wherein the outer surface of the spacer tube further comprises a proximal recess that accommodates the proximal guide ring and a distal recess that accommodates the distal guide ring.
- 25 6. The valve of claim 1 wherein the proximal guide ring is welded to the proximal end of the spacer tube and the distal guide ring is welded to the distal end of the spacer tube.

7. A valve comprising:

a valve body,

a cage assembly defining a bore extending along an axis, the cage assembly comprising a cage retainer comprising a proximal end connected to the valve body and a distal end coaxially connected to a cage, the cage retainer and valve body being fabricated from a first material having a first coefficient of thermal expansion (CTE), the cage being fabricated from a second material having a second CTE,

a plug comprising a spacer tube comprising a proximal end received in the cage retainer, a distal end received in the cage and an outer surface, the proximal end of the spacer tube being connected to a proximal guide ring, the distal end of the spacer tube being connected to a distal guide ring, the outer surface of the plug and the proximal and distal guide rings being sized to fit inside the bore defined by the cage assembly and adapted for slidable movement along the axis of the bore, the spacer tube being fabricated from a third material having a third CTE within 10% of said first CTE, the proximal guide ring being fabricated from a fourth material having a fourth CTE within 10% of said first CTE, the distal guide ring being fabricated from fifth material having a fifth CTE within 10% of said second CTE.

8. The valve of claim 7 wherein the first, third and fourth materials are alloy steels and the second and fifth materials are austenitic stainless steels.

9. The valve of claim 7 wherein the first, third and fourth materials are the same and are an alloy steel and the second and fifth materials are the same and are an austenitic stainless steel.

10. The valve of claim 7 wherein the outer surface of the spacer tube further comprises a proximal recess that accommodates the proximal guide ring and a distal recess that accommodates the distal guide ring.

11. The valve of claim 7 wherein the proximal guide ring is welded to the proximal end of the spacer tube and the distal guide ring is welded to the distal end of the spacer tube.

12. The valve body of claim 7 wherein the valve body is fabricated from an alloy steel.

13. A valve comprising:
5 a valve body fabricated from a first material having a first coefficient or thermal expansion (CTE), a cage, a seat ring and a plug,
the cage defining a bore extending along an axis, the cage comprising a proximal end connected to the valve body and a distal end mateably received in the seat ring, the cage being fabricated from a second material having a second coefficient
10 of thermal expansion (CTE),
a plug comprising a spacer tube comprising a proximal end, a distal end and an outer surface, the proximal end of the spacer tube being connected to a proximal guide ring, the distal end of the spacer tube being connected to a distal guide ring, the outer surface of the plug and the proximal and distal guide rings being sized to fit
15 inside the bore defined by the cage and adapted for slidable movement along the axis of the bore, the spacer tube being fabricated from a third material having a third CTE within 10% of said first CTE, the proximal and distal guide rings being fabricated from a fourth material having a fourth CTE within 10% of said second CTE.

20 14. The valve of claim 13 wherein the second and fourth materials are austenitic stainless steels.

15 15. The valve of claim 13 wherein the first and third materials are the same and are an alloy steel.

25 16. The valve of claim 13 wherein the outer surface of the spacer tube further comprises a proximal recess that accommodates the proximal guide ring and a distal recess that accommodates the distal guide ring.

30 17. The valve of claim 13 wherein the proximal guide ring is welded to the proximal end of the spacer tube and the distal guide ring is welded to the distal end of the spacer tube.

18. A valve comprising:
a valve body, a bonnet, a cage, a seat ring and a plug,
the valve body comprising an inlet, an outlet and a third opening covered by
the bonnet,

5 the bonnet being secured to the valve body at the third opening and
comprising a cylindrical retainer having an open distal end connected to a proximal
end of the cage, the bonnet and valve body being fabricated from a first material
having a first coefficient of thermal expansion (CTE),
the cage and cylindrical retainer of the bonnet defining a bore extending along
10 an axis, the cage further comprising a distal end coaxially connected to the seat ring,
the seat ring connected to the inlet of valve body, the cage being fabricated from a
second material having a second coefficient of thermal expansion (CTE),
a plug comprising a spacer tube comprising a proximal end, a distal end and
an outer surface, the proximal end of the spacer tube being connected to a proximal
15 guide ring, the distal end of the spacer tube being connected to a distal guide ring, the
outer surface of the plug and the proximal and distal guide rings being sized to fit
inside the bore defined by the cage and cylindrical retainer of the bonnet and adapted
for slidable movement along the axis of the bore, the spacer tube being fabricated
from a third material having a third CTE within 10% of said first CTE, the proximal
20 guide ring being fabricated from a fourth material having a fourth CTE within 10% of
said first CTE and the distal guide ring being fabricated from a fifth material having a
fifth CTE within 10% of said second CTE.

19. The valve of claim 18 wherein the first, third and fourth materials are
25 alloy steels and the second and fifth materials are austenitic stainless steels.

20. The valve of claim 18 wherein the first, third and fourth materials are
the same and are an alloy steel and the second and fifth materials are the same and are
an austenitic stainless steel.

30

21. The valve of claim 18 wherein the outer surface of the spacer tube
further comprises a proximal recess that accommodates the proximal guide ring and a
distal recess that accommodates the distal guide ring.

22. The valve of claim 17 wherein the proximal guide ring is welded to the proximal end of the spacer tube and the distal guide ring is welded to the distal end of the spacer tube.

5 23. A valve comprising:
a valve body, a cage, a seat ring and a plug,
the valve body comprising an inlet, an outlet and a cylindrical cage retainer
disposed therebetween, the cylindrical cage retainer having an open distal end axially
connected to a proximal end of the cage, the valve body being fabricated from a first
10 material having a first coefficient of thermal expansion (CTE),
the cage and cylindrical retainer of the valve body defining a bore extending
along an axis, the cage further comprising a distal end coaxially connected to the seat
ring, the seat ring connected to the inlet of valve body, the cage being fabricated from
a second material having a second coefficient of thermal expansion (CTE),
15 a plug comprising a spacer tube comprising a proximal end, a distal end and
an outer surface, the proximal end of the spacer tube being connected to a proximal
guide ring, the distal end of the spacer tube being connected to a distal guide ring, the
outer surface of the plug and the proximal and distal guide rings being sized to fit
inside the bore defined by the cage and cylindrical retainer of the valve body and
20 adapted for slidable movement along the axis of the bore , the spacer tube being
fabricated from a third material having a third CTE within 10% of said first CTE, the
proximal guide ring being fabricated from a fourth material having a fourth CTE
within 10% of said first CTE and the distal guide ring being fabricated from a fifth
material having a fifth CTE within 10% of said second CTE.

25 24. The valve of claim 23 wherein the first, third and fourth materials are
alloy steels and the second and fifth materials are austenitic stainless steels.

30 25. The valve of claim 23 wherein the first, third and fourth materials are
the same and are an alloy steel and the second and fifth materials are the same and are
an austenitic stainless steel.

26. The valve of claim 23 wherein the outer surface of the spacer tube further comprises a proximal recess that accommodates the proximal guide ring and a distal recess that accommodates the distal guide ring.

- 5 27. The valve of claim 23 wherein the proximal guide ring is welded to the proximal end of the spacer tube and the distal guide ring is welded to the distal end of the spacer tube.